Use of Localized HEPA Filtered Ventilation for Radiological Work

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ALARA Goals

- Workers need to practice:
  - Reducing radiation exposure to workers
  - Limit the spread of radioactive contamination
  - Minimize the production of radioactive waste

Localized HEPA Filtered Vent

- A good engineered control method
  - Used to capture radioactive particles produced during work
  - Used to control existing loose surface contamination in a work zone

HEPA filtered Vent Systems

- Portable unit:
  - Small, compact
  - HEPA filtered and pre-filters
  - Can be cleaned without damaging the aerosol leak test certification
  - Used primarily with glovebags

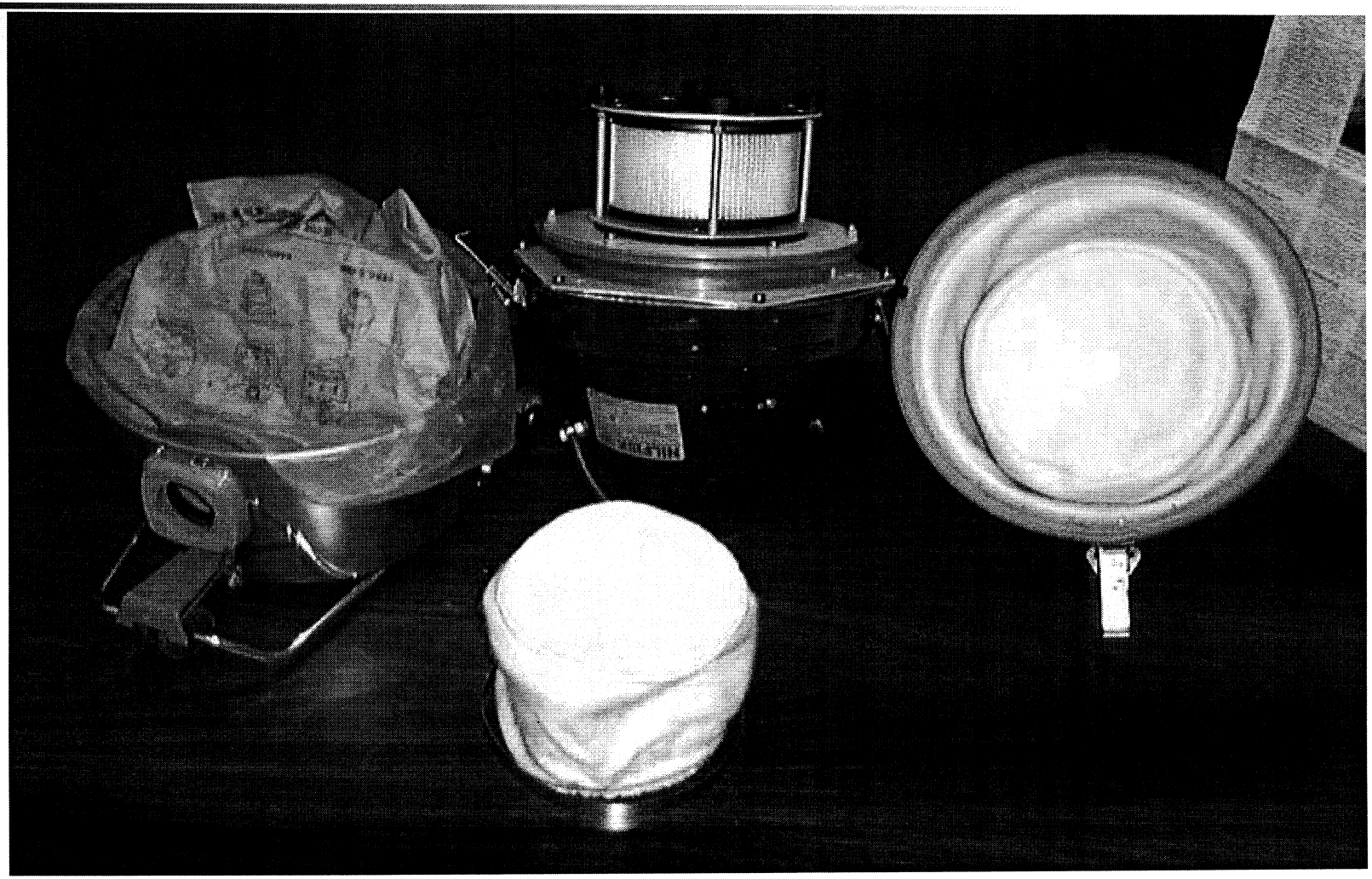
Systems (Continued)

- Exhausters
  - Larger units, higher flow. At Hanford to 2000 CFM based on an Notice Of Construction.
  - HEPA and pre-filtered
  - Can be dampened to regulate flow
  - Hoses can be branched to better control the air flow

Typical Portable Unit

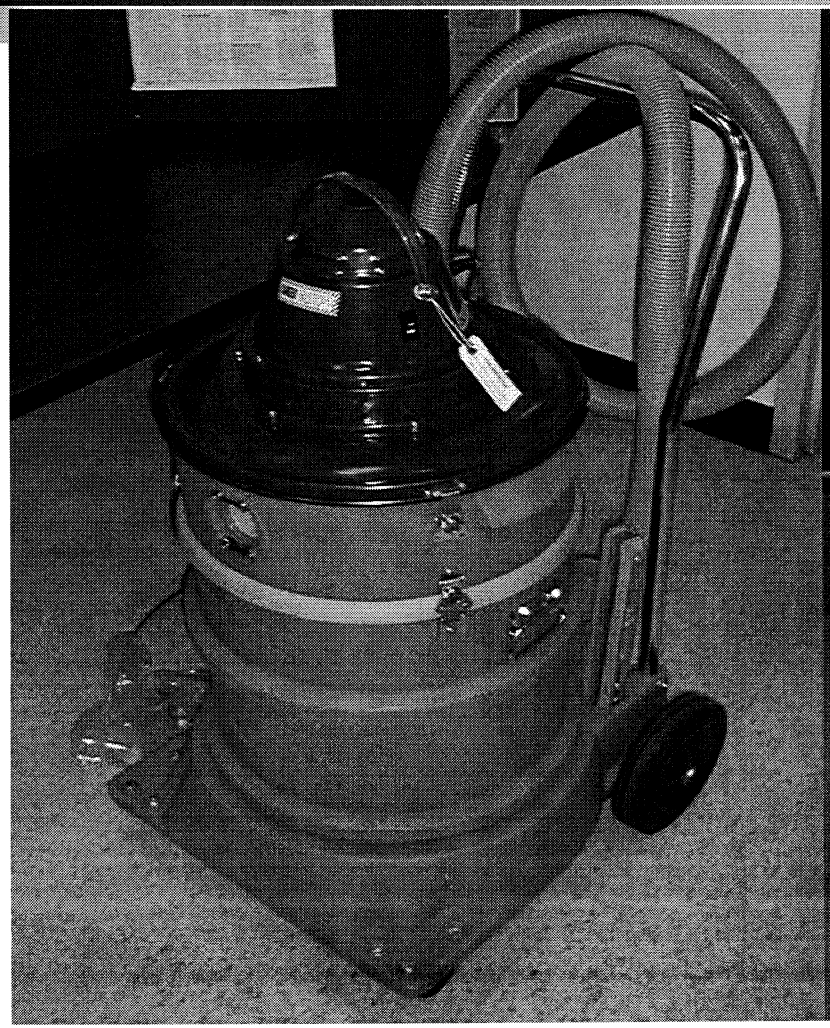
- GM-80 unit
- Has speed controller
- Four stages of Filtration
- Bag can be emptied w/o breaking the aerosol leak testing Seal
- Has a speed controller, to control volume of air

Break Down of a GM-80 Vac



HEPA Filtered Vacuum Cleaner

Wet and Dry Vacuum Cleaner

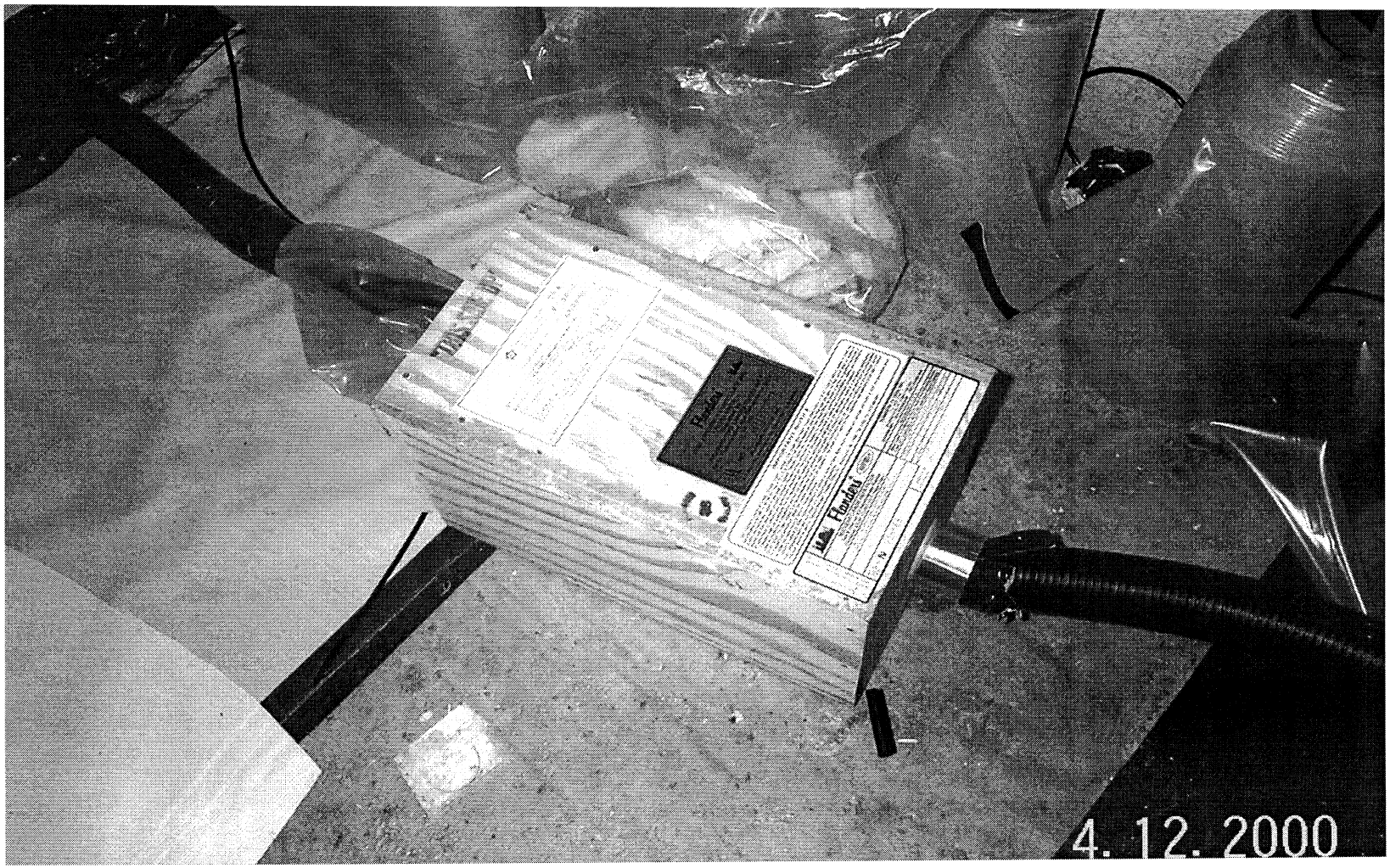


In-Line Chip Collectors and Filters

- In-Line chip collector (rock stoppers) can be as simple a can with a lid with two ports.
- In-Line filters can be HEPA, pre-filter material, scotch foam or other material

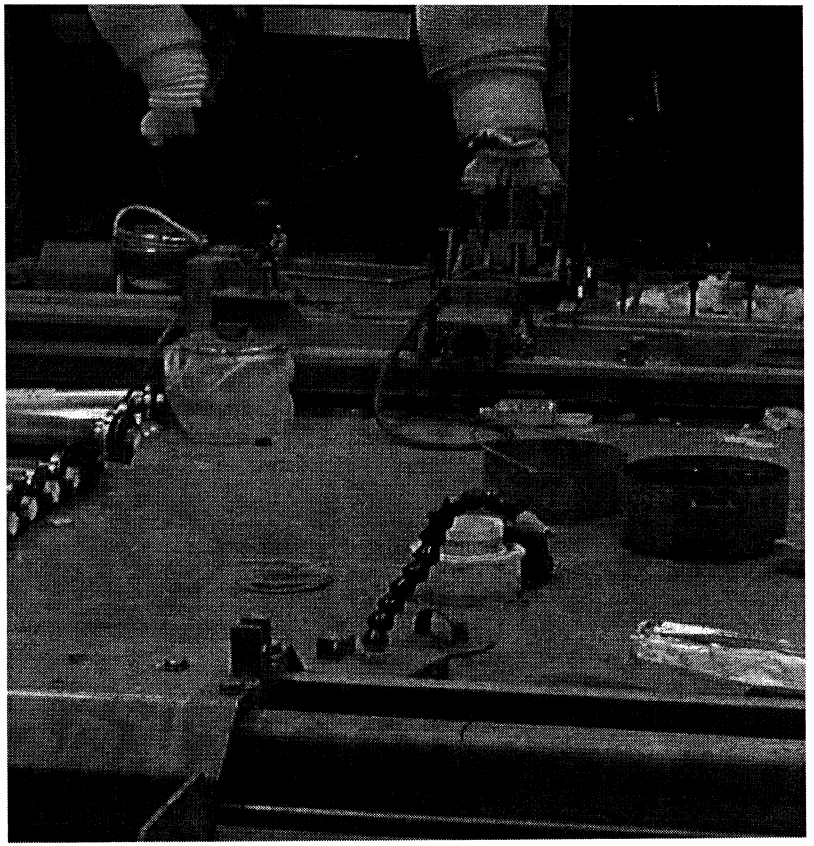
In-Line HEPA Pre-Filter

Used between the Source and vacuum



Vent Snorkel in a Hot Cell

- Allows concentration or different geometry of air flow depending on the tip used.
- Flexible, easily adjustable to the work. Length easily modified.



Shrouded Tools w/ Vacuums

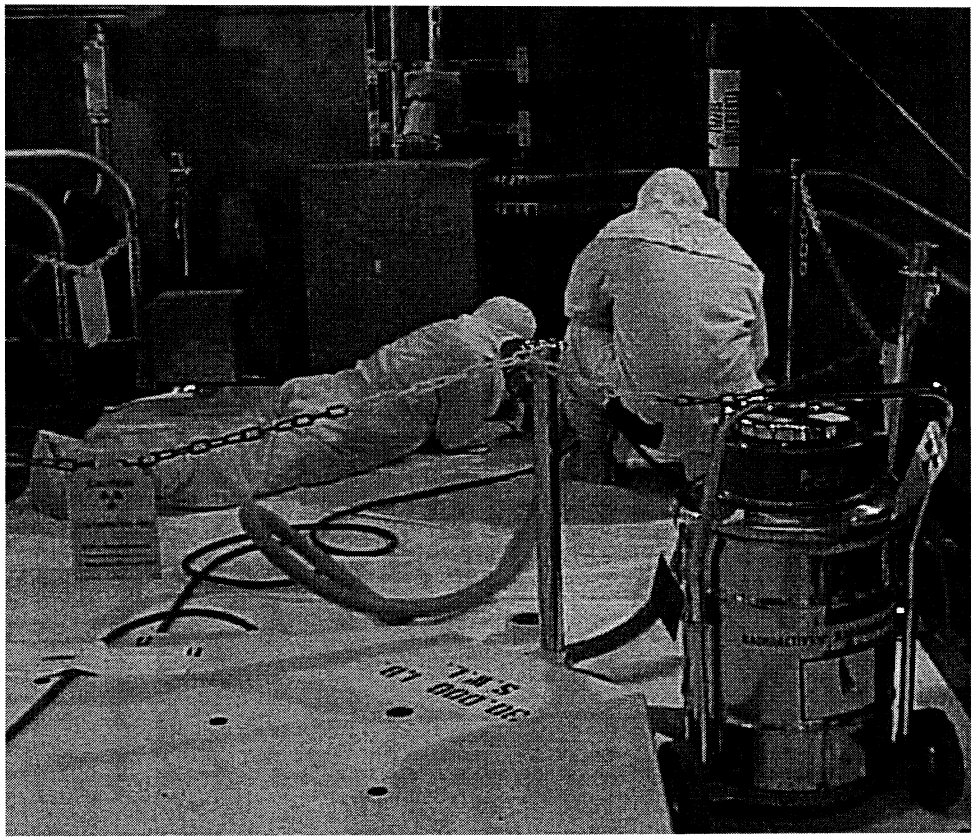
- Shrouded tools used with HEPA vacuums give additional protection to the worker.
- Collects a high percentage of debris created during work.

Shrouded Tool in Use

- A shrouded tool attached to a HEPA Filtered vacuum cleaner is used, remove radioactively contaminated paint from a floor surface.

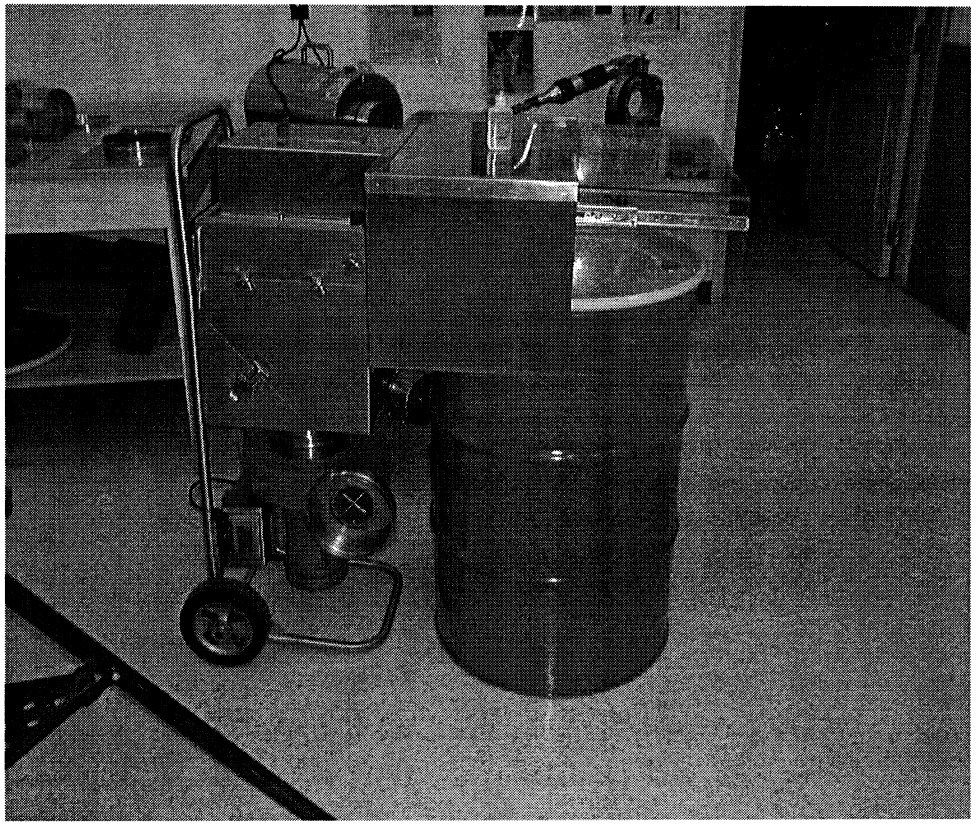
HEPA Filtered Vacuum

- A HEPA Filtered vacuum cleaner supporting the shrouded tool, used to remove contaminated paint.



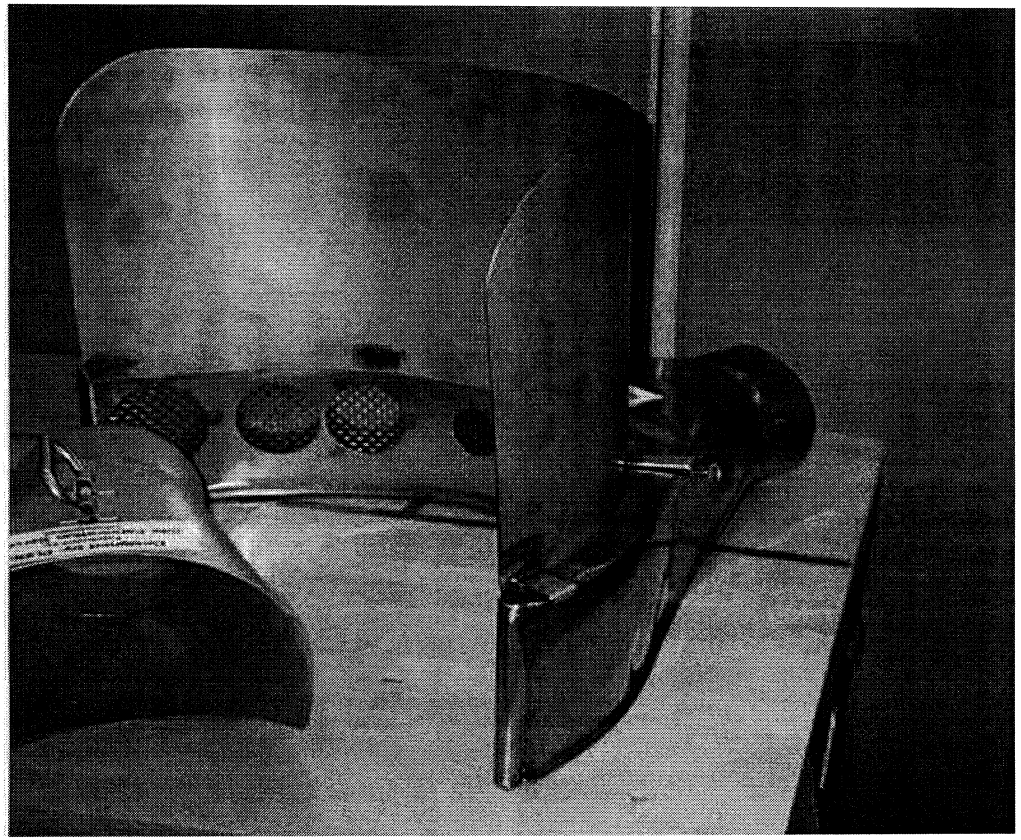
MAC-21 Drum Hood

- HEPA Filtered exhauster
- Mounted hood for drums
- Gives up to 350 FPM flow over the drum lid
- 55 and 85 Gal. Drums



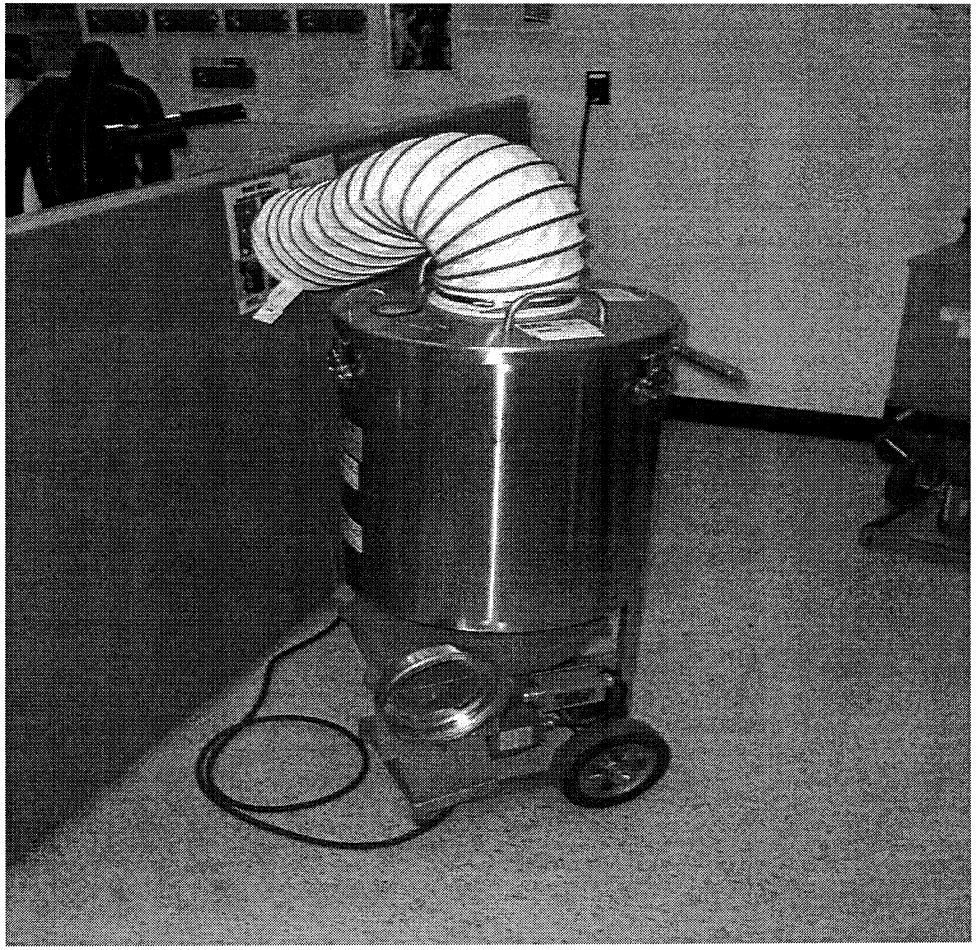
Drum Scoop

- Drum hood with an upper shield developed for 55 gallon drums
- Localized ventilation scoop in the left front.



HEPA Filtered Vent Exhauster

- 750 CFM Unit
- Pre-filtered
- HEPA filtered
- Dampened at the exhaust
- Some units are dust and weather proof
- 110 Volt AC



Erecting Tent with Positive Air

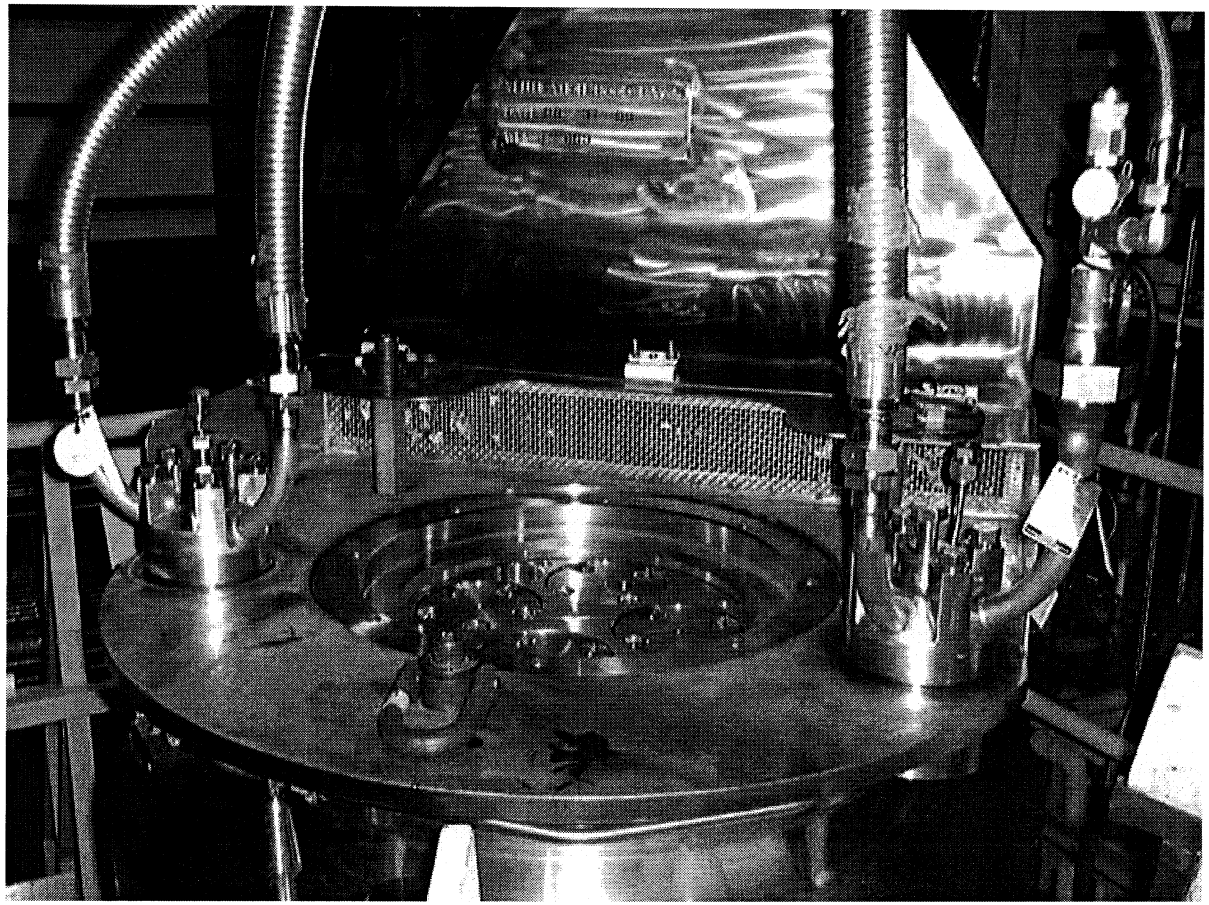
- Using a HEPA filtered exhauster to inflate a tent in a contaminated canyon. Keeps the inside (work area) clean for future work.

Erected tent with Positive Air

- Once erected, scaffolding is added inside to support the tent. Work may commence without Personal Protective Equipment for the worker.

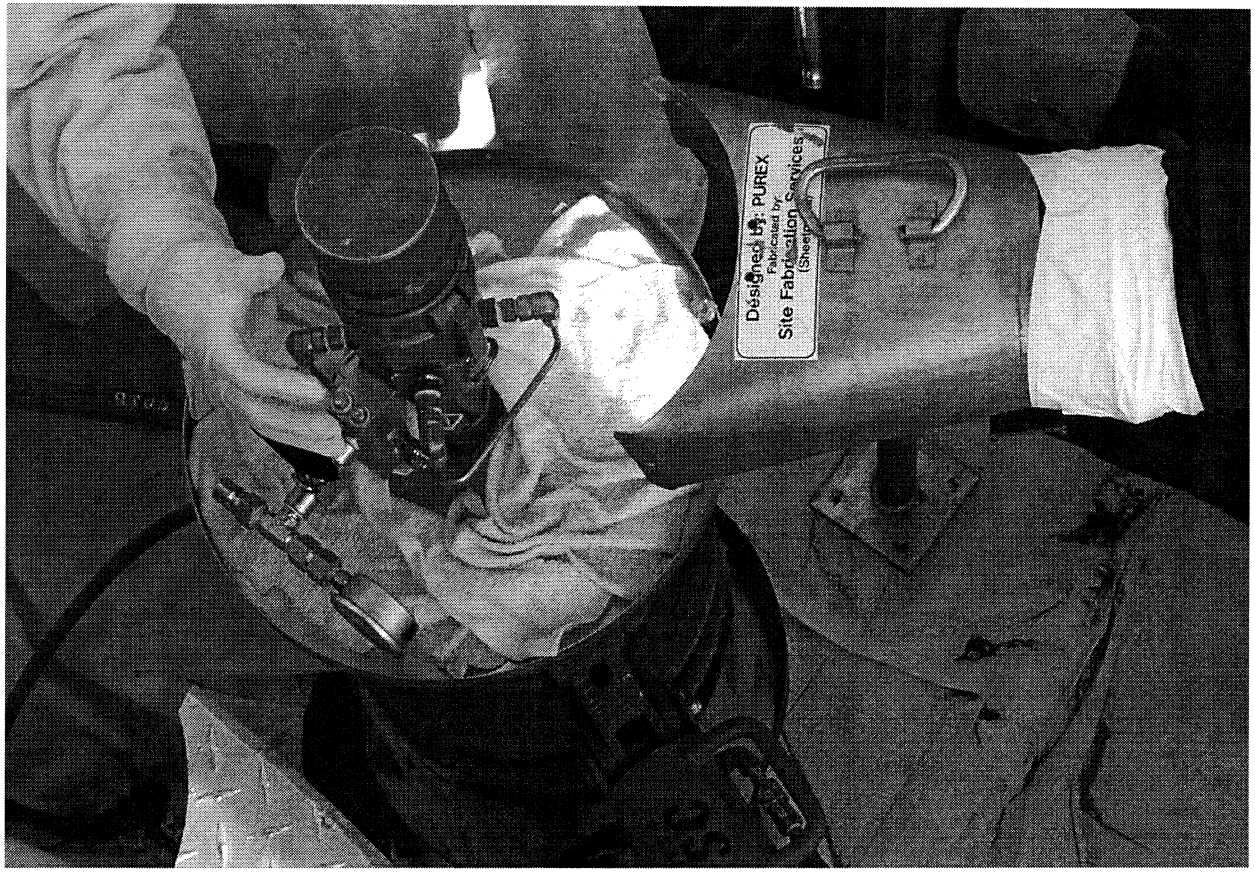
Ventilation Intake Scoop

- A Vent scoop built into the drying assembly also removes any radioactive contaminates.



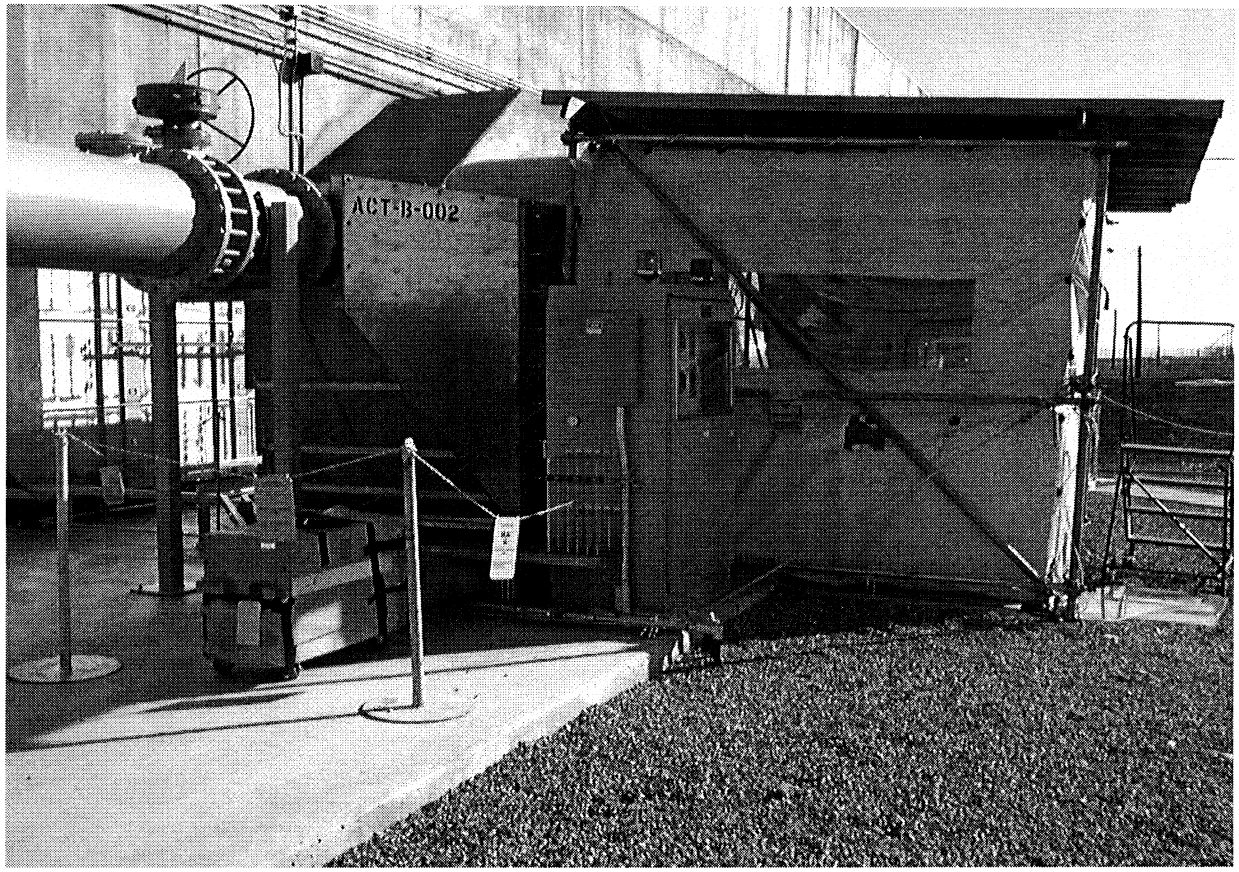
Vent Scoop for Sampling

- A Negative Vent Scoop is placed adjacent to the sample location and was able to allow work without a glovebag.



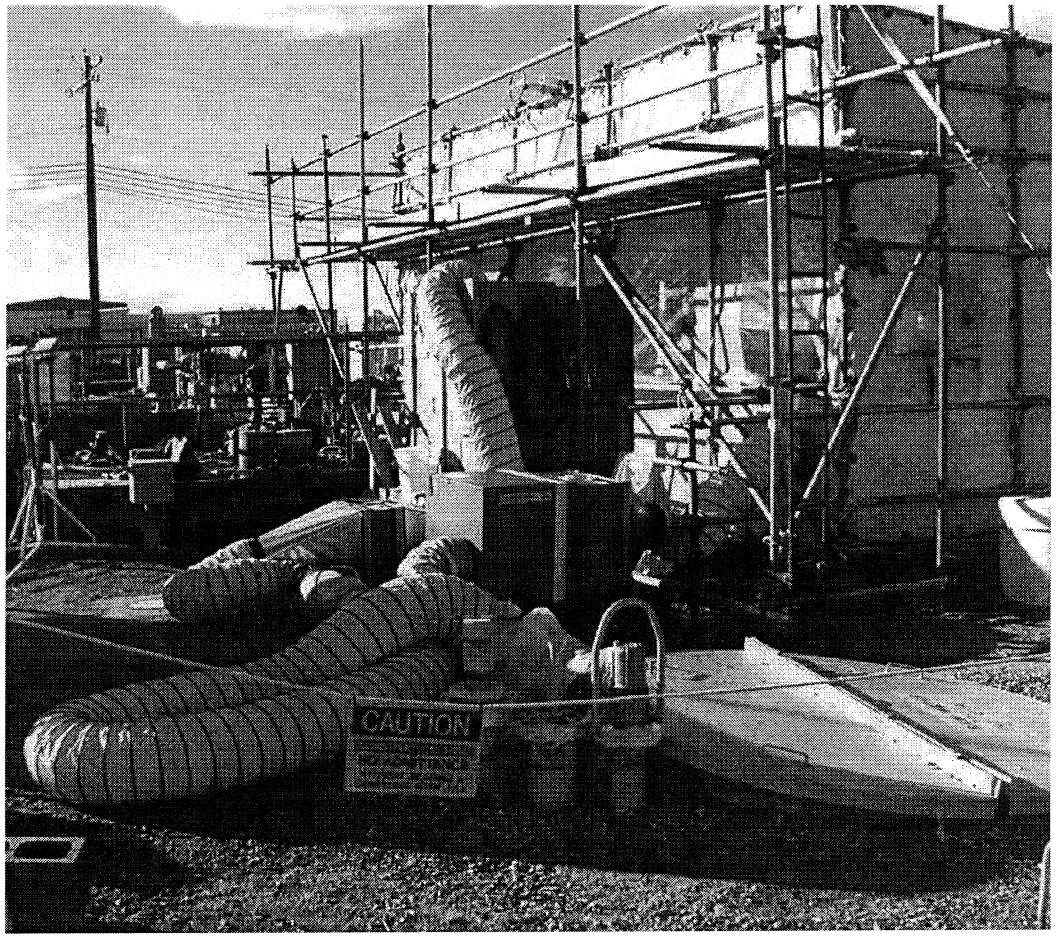
Filter Change out Tent Vent

- An exhauster is used for tent vent and branched for localized ventilation for a filter replacement.



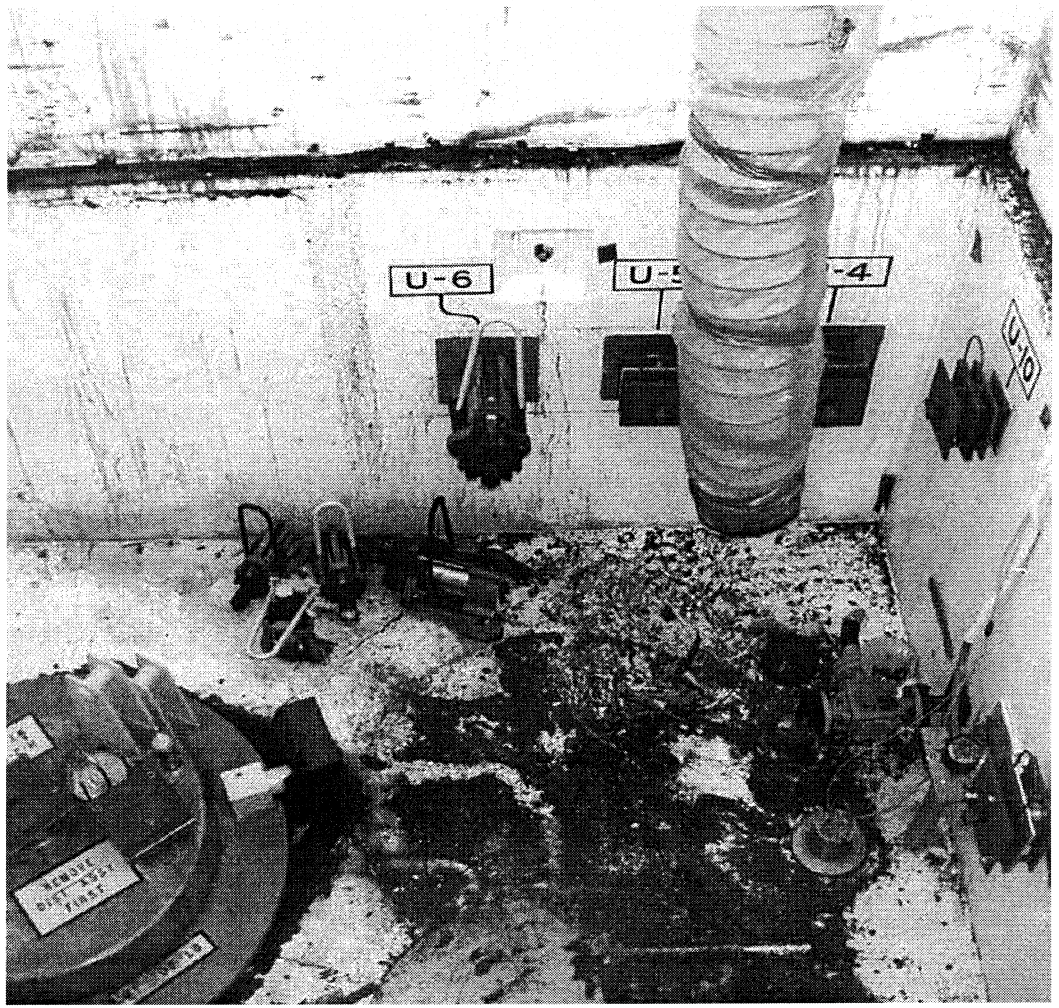
Tent Exhauster for Pit Work

- Exhauster, HEPA Filter unit and ducting supporting pit work inside a tent (greenhouse).



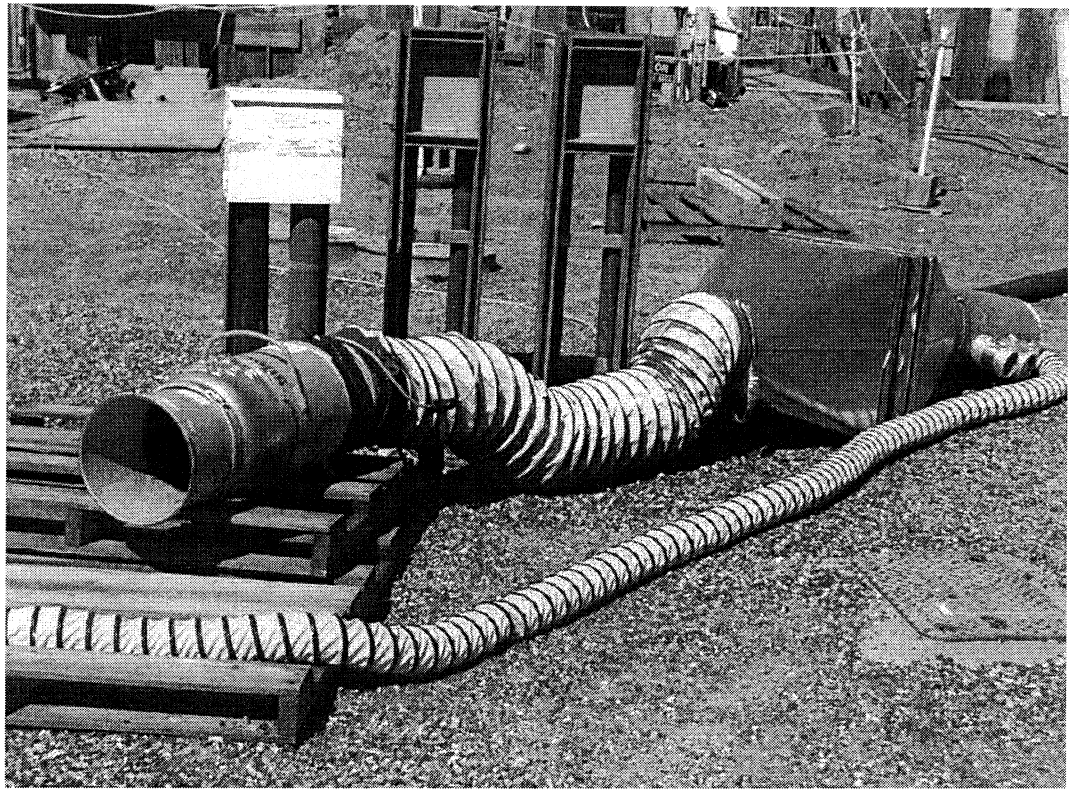
Pit HEPA Filtered Exhaust Trunk

- The suction ducting inside the transfer pit. Ducting is placed within two feet of the floor to better capture contaminates.



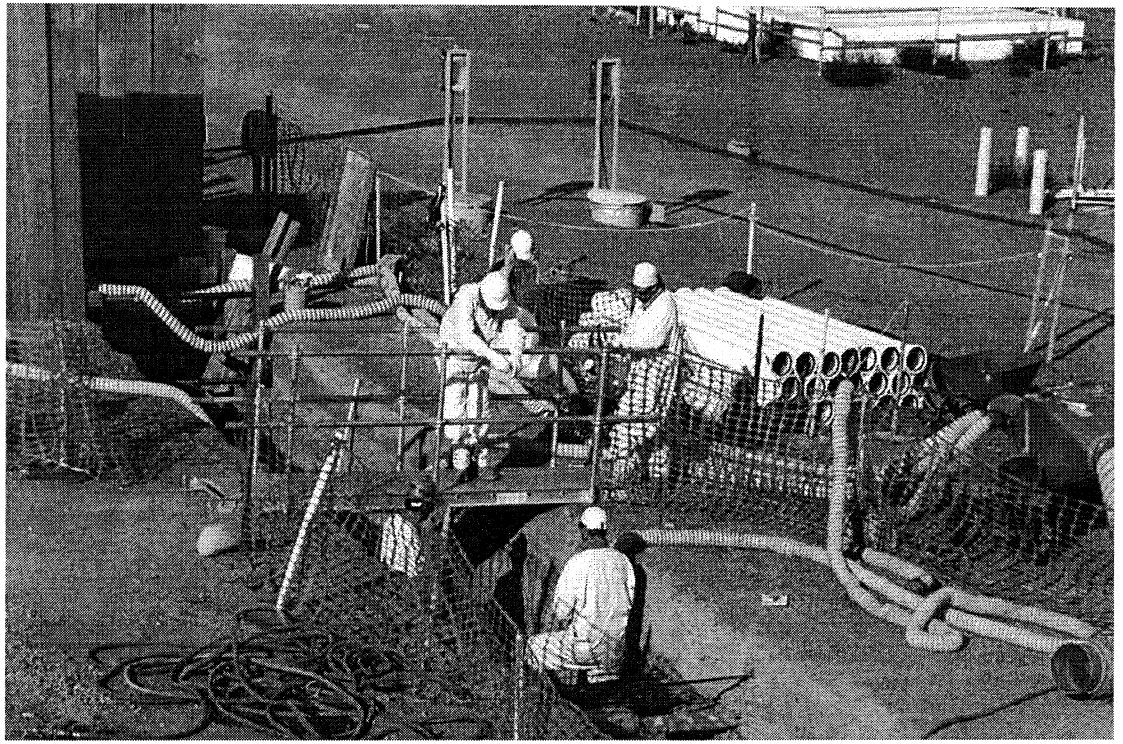
Field HEPA Filtered System

- A copus blower with an in-line HEPA filter with and octopus trunk.



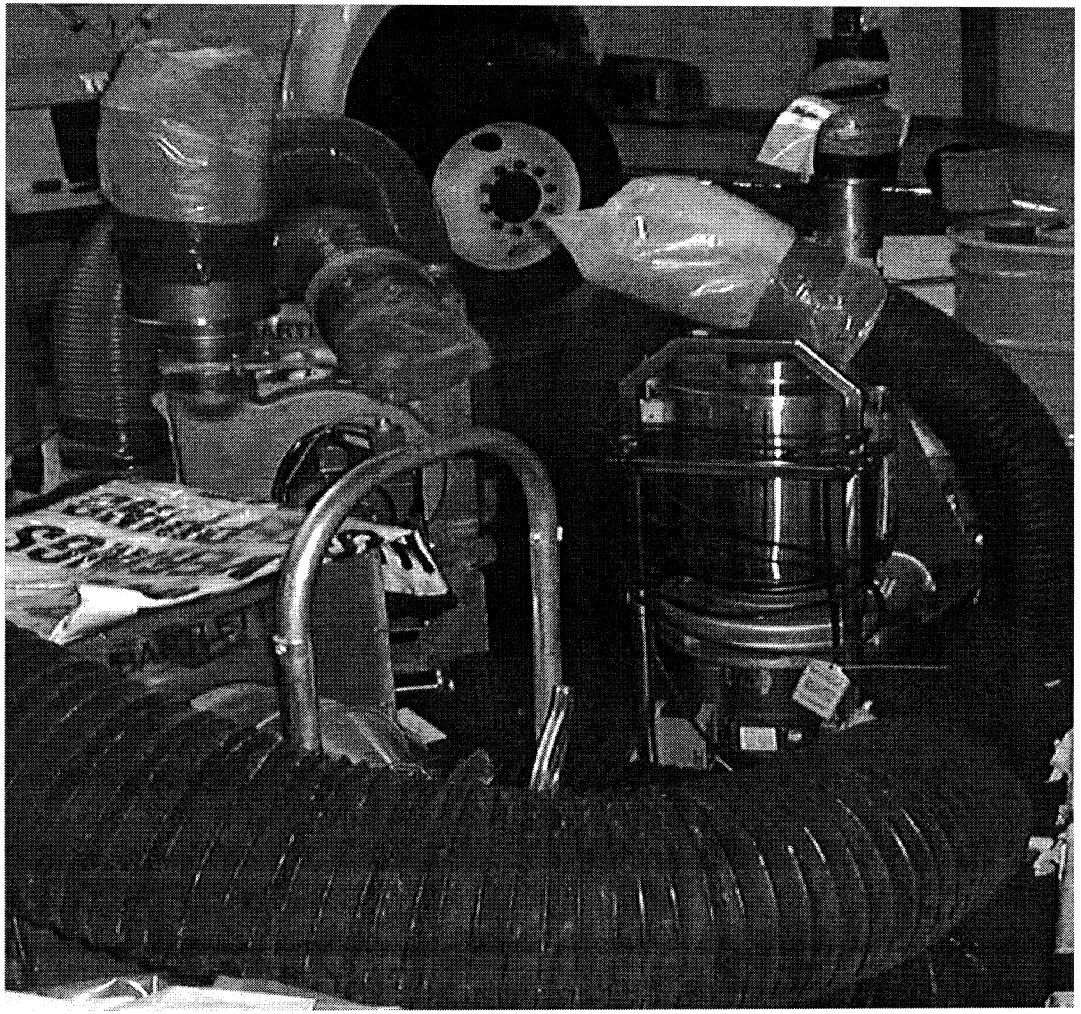
Field System In Use

- Multiple legs of the HEPA Filtered system, servicing multiple jobs



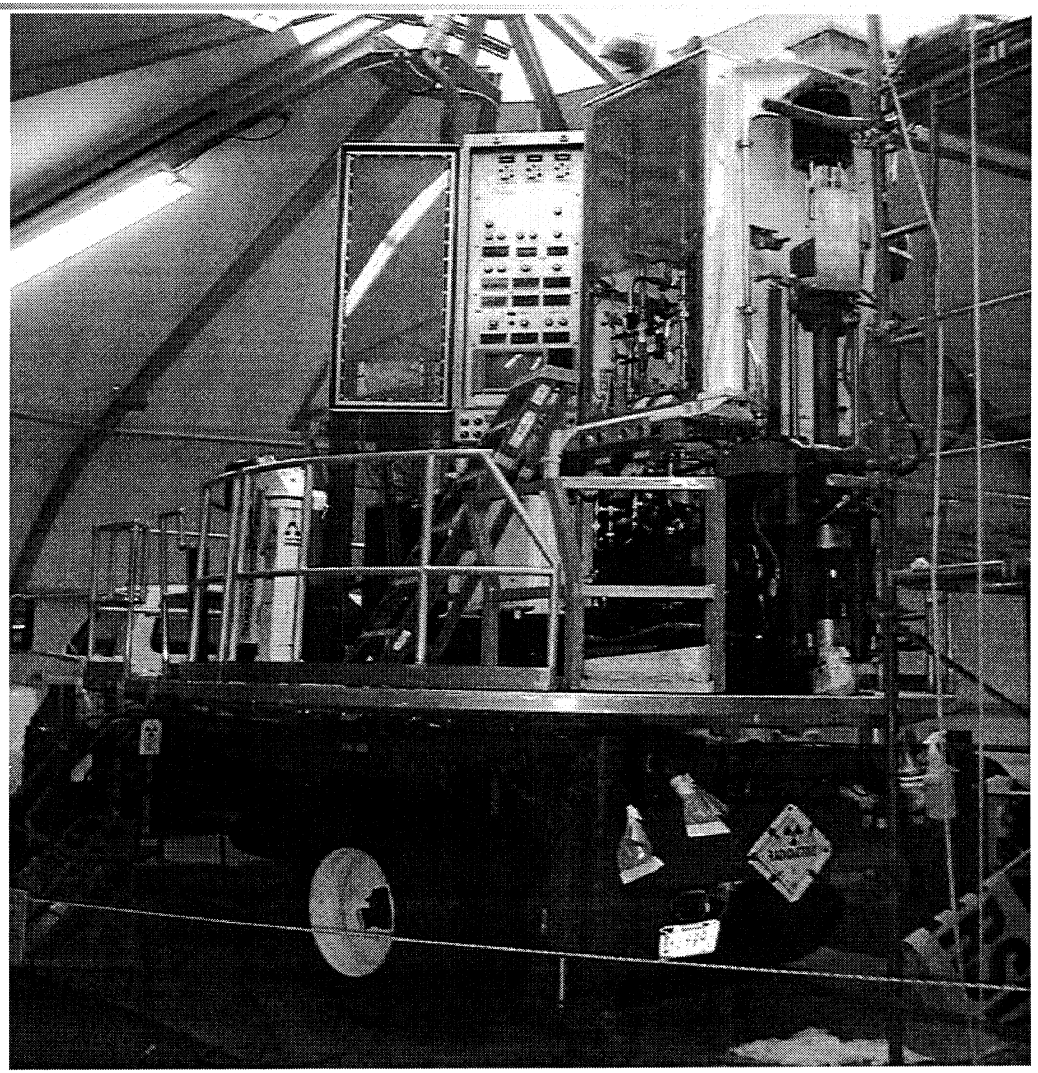
Vent for Tank Sample Truck

- Three exhausters used for negative HEPA filter vent during sampling. Items are in standby storage.
- Front unit is 1000 CFM unit.



Tank Sampling Truck

- Tank sampling truck in standby storage. Ventilation connections are bagged in yellow.



Smoke Test of Air Flow

- Using baby powder, the worker can determine effectiveness of the installed negative HEPA filtered ventilation.

Vent Trunk to Rad Work Area

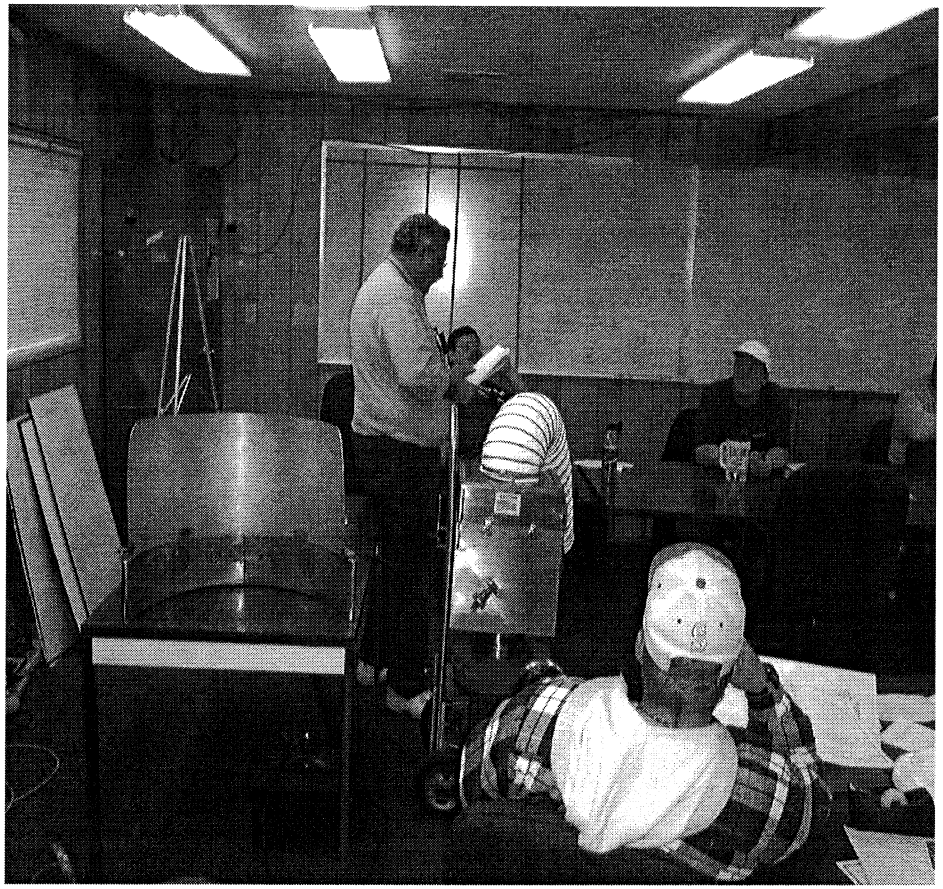
- A HEPA filtered ventilation trunk has been run into the back of the work area for airborne radioactive contamination control.

Training Workers on Vent Use

- Use mockup system to demonstrate air flow based on duct size
  - Use smoke/powder for visual effects
  - Use shields to demonstrate methods of increasing capture
  - Discuss workers' body position in relationship with the source and the vent
  - Use the standard flow chart
  - Teach to get within one duct diameter of the source

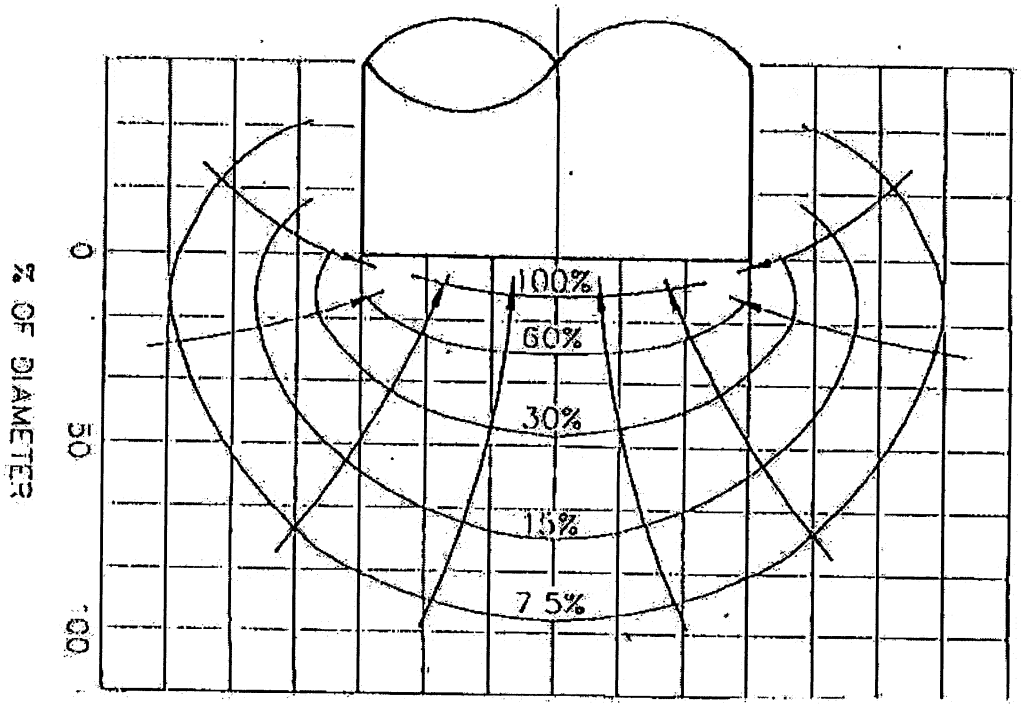
Training RCTs in Use of Vent

- The ALARA Center trains RCTs, Operations and Maintenance personnel in the proper use of HEPA filter vacuum cleaners and exhausters



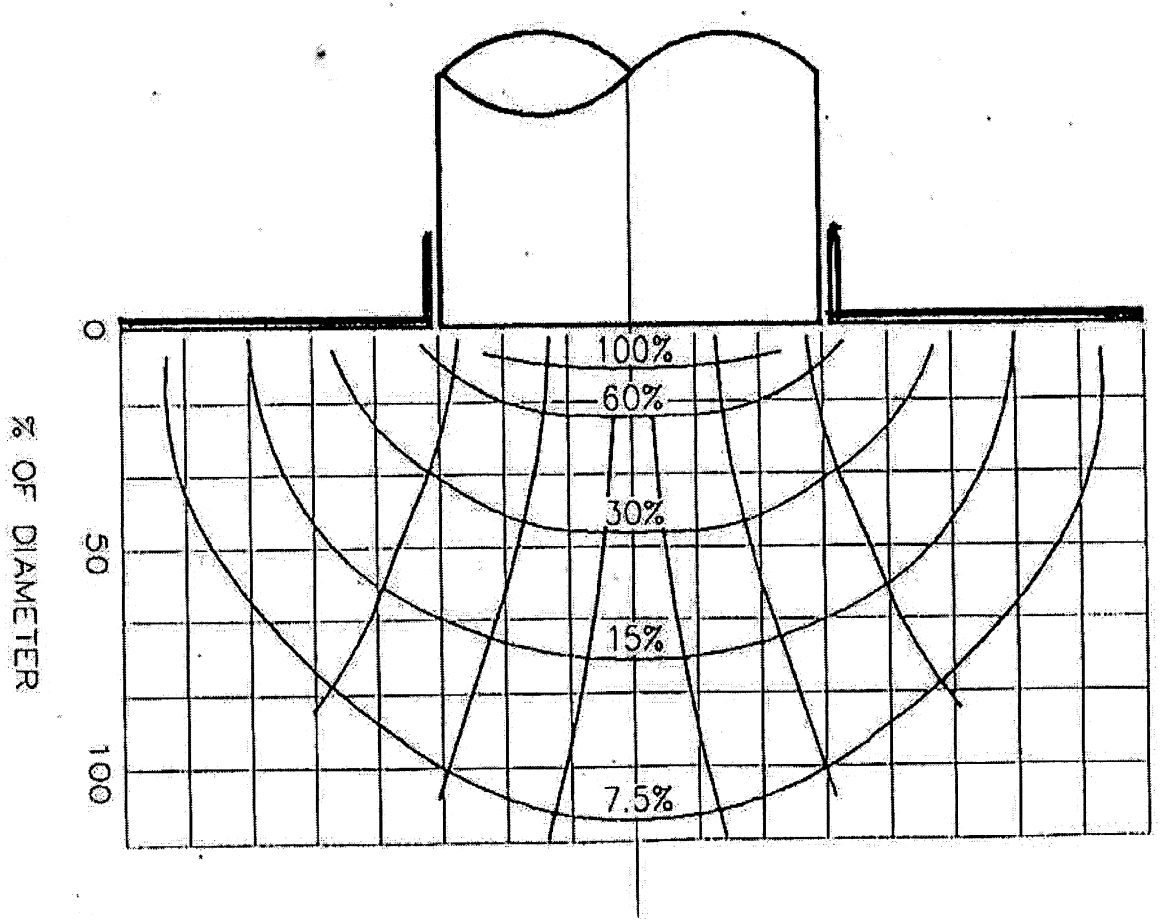
Negative Vent Capture

- Effective capture is based on one duct diameter of the vent hose or less from the source. At one duct diameter, ~7.5% of the flow rate is present.



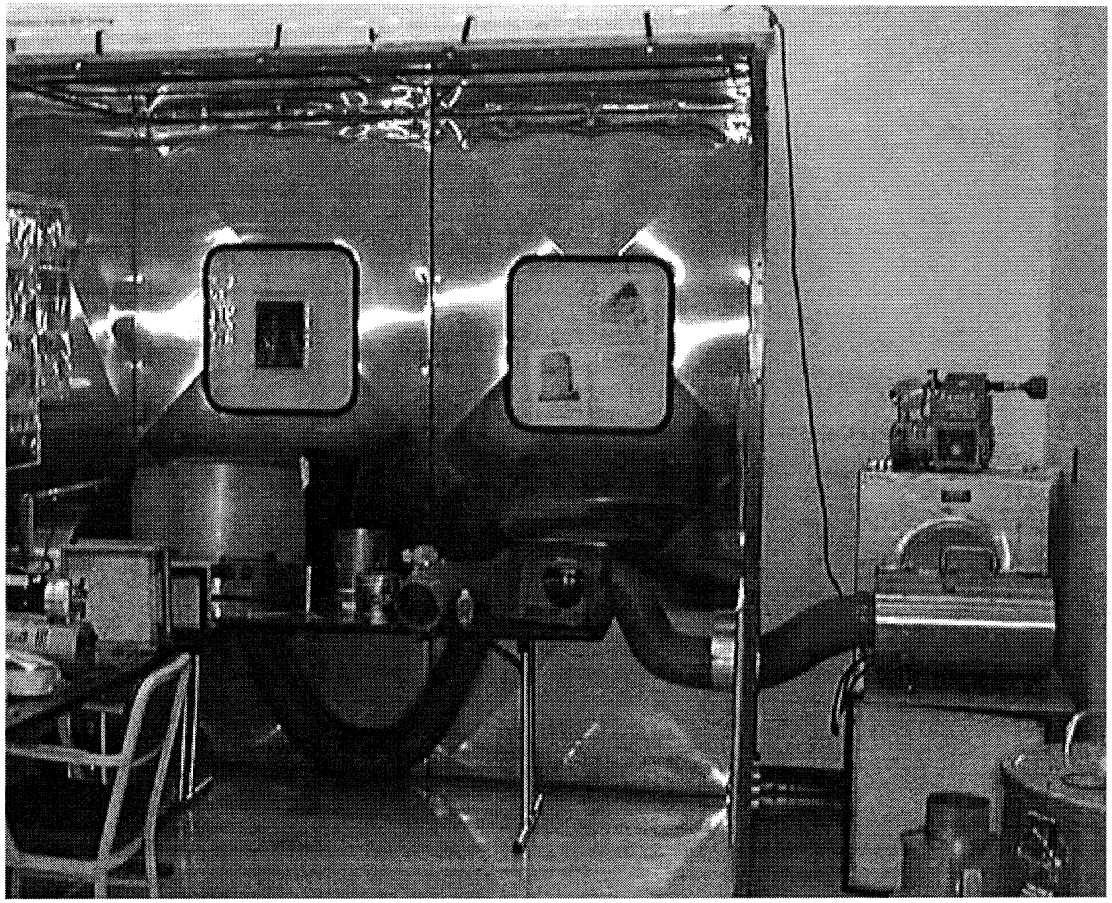
With a Collar, Flow Increases

- Blocking the flow from the side of the hose increases the flow and capture of contaminates from the front of the hose. At one duct diameter ~10% of the flow rate is present



Vent Training Area

- At the ALARA Center, a ventilation mockup is present to demonstrate air flow and capture of contaminates.



Points of Contact at the Center

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